Number Properties and Operations

Middle grades students understand fractions, decimals, percents and integers, compare them and locate their relative positions on a number line. They develop and use proportional reasoning to solve problems. They work with large numbers and small numbers. They use factors, multiples and prime factorizations. They perform arithmetic operations with fractions, decimals and integers, use properties in computation, develop fluency and develop strategies to estimate the result of operations on rational numbers.

6th Grade	7th Grade	8th Grade
Number Sense		
MA-06-1.1.1 **Students will provide examples of and describe fractions, decimals, and percents.** **DOK - 1** *MA-06-1.1.1a* *Students will describe and provide examples of representations of numbers (whole numbers, fractions in simplest form, mixed numbers, decimals, percents) and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences), based on real-world and/or mathematical situations.*	**MA-07-1.1.1** **Students will provide examples of and describe integers, fractions, decimals, percents, and π.** **DOK - 1** *MA-07-1.1.1a* *Students will describe and provide examples of representations of numbers (whole numbers, fractions, decimals, percents, integers, square roots, and π) and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences), based on real-world and/or mathematical situations.*	**MA-08-1.1.1** **Students will provide examples of and describe rational numbers and irrational numbers (square roots and π only).** **DOK - 1** *MA-08-1.1.1a* *Students will describe and provide examples of representations of numbers (rational, square roots, and π) and operations in a variety of equivalent forms using models, diagrams, and symbols (e.g., number lines, 10 by 10 grids, rectangular arrays, number sentences), based on real-world and/or mathematical situations.*
MA-06-1.1.2 **Students will convert between any two of the following numbers: fractions, decimals, and percents (less than or equal to 100%; and will compare these numbers.** **DOK - 2**	**MA-07-1.1.2** **Students will convert among whole numbers, fractions, decimals, percents, and π, and will compare these numbers.** **DOK - 3**	**MA-08-1.1.2** **Students will compare multiple numerical representations (e.g., fractions, decimals, percentages) of rational numbers and irrational numbers (square roots and π only).** **DOK - 3**
Estimation		
MA-06-1.2.1 **Students will estimate to solve real-world and/or mathematical problems with whole numbers, fractions, decimals, and percents, checking for reasonable and appropriate computational results.** **DOK - 2**	**MA-07-1.2.1** **Students will estimate to solve real-world and/or mathematical problems with fractions, decimals, and percents, checking for reasonable and appropriate computational results.** **DOK - 2**	**MA-08-1.2.1** **Students will estimate to solve real-world and/or mathematical problems with rational numbers, checking for reasonable and appropriate computational results** **DOK - 2**

Number Operations

MA-06-1.3.1	MA-07-1.3.1	MA-08-1.3.1
Students will add, subtract, multiply, divide, and apply order of operations with whole numbers, fractions, and decimals to solve real-world problems. **DOK - 2** *MA-06-1.3.1a* *Students will explain how operations (addition and subtraction; multiplication and division) are inversely related.* *MA-06-1.3.1b* *Students will check for reasonable and appropriate computational results, using a variety of methods (e.g., estimate, pencil and paper, calculator, rounding, mental math).*	**Students will add, subtract, multiply, divide, and apply order of operations (including positive whole number exponents) with whole numbers, fractions, and decimals to solve real-world problems.** **DOK - 2** *MA-07-1.3.1a* *Students will explain how operations (addition and subtraction; multiplication and division) are inversely related.* *MA-07-1.3.1b* *Students will check for reasonable and appropriate computational results, using a variety of methods (e.g., estimate, pencil and paper, calculator, round, mental math).* *MA-07-1.3.1c* *Students will add and subtract integers.*	**Students will add, subtract, multiply, divide, and apply order of operations (including positive whole number exponents) with rational numbers to solve real-world problems.** **DOK - 2** *MA-08-1.3.1a* *Students will explain how operations (additions and subtraction; multiplication and division; squaring and taking the square root of a number) are inversely related.* *MA-08-1.3.1b* *Students will check reasonable and appropriate computational results, using a variety of methods (e.g., estimate, pencil and paper, calculator, round, mental math).*

Ratios and Proportional Reasoning

MA-06-1.4.1	MA-07-1.4.1	MA-08-1.4.1
Students will describe and apply ratios to solve real-world problems. **DOK - 2**	**Students will apply ratios and proportional reasoning to solve real-world problems (e.g., percents, sales tax, discounts, rate).** **DOK - 3**	**Students will apply ratios and proportional reasoning to solve real-world problems (e.g., percents, constant rate of change, unit pricing, percent of increase or decrease).** **DOK - 3**

Properties of Numbers and Operations

MA-06-1.5.1	MA-07-1.5.1	
Students will identify and apply prime numbers, composite numbers, prime factorization, factors, multiples, and divisibility to solve real-world problems (e.g., prime factorization to determine a least common multiple [LCM] or greatest common factor [GCF]). **DOK - 2**	**Students will identify and apply prime numbers, composite numbers, prime factorization, factors, multiples, and divisibility to solve real-world problems (e.g., prime factorization to determine a least common multiple [LCM] or greatest common factor [GCF]).** **DOK - 2**	

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MA-06-1.5.2 **Students will identify how the commutative properties, the associative properties, and the identity properties for addition and multiplication are used to simplify numerical expressions.** **DOK - 1**	MA-07-1.5.2 **Students will identify how the commutative properties, the associative properties, and the identity properties for addition and multiplication are used to justify a given step in solving problems.** **DOK - 1**	MA-08-1.5.2 **Students will identify how the commutative properties, the associative properties, the distributive property, the identity properties for addition and multiplication, and inverse relationships justify a given step in solving problems.** **DOK - 1**

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Measurement
Students continue to measure and estimate measurements including fractions and decimals. They use formulas to find perimeter, area, circumference and volume. They use rulers and protractors. They use US Customary and metric units of measurement.

6th Grade	7th Grade	8th Grade
Measuring Physical Attributes		
MA-06-2.1.1 **Students will determine:** • **Measures of rectangles and figures that can be divided into rectangular shapes, including lengths to the nearest eighth of an inch or nearest centimeter; and** • **The area and perimeter of triangles and quadrilaterals (rectangles, squares). (Using the Pythagorean theorem will not be required as a strategy.)** **DOK - 2** *MA-06-2.1.1a* *Students will estimate measurements in standard units including fractions and decimals.* *MA-06-2.1.1b* *Students will explain how measurements and measurement formulas are related or different (perimeter and area of rectangles).*	**MA-07-2.1.1** **Students will determine:** • **Measures of both regular and irregular polygons, including length to the nearest eighth of an inch or nearest centimeter;** • **The area and perimeter of triangles and quadrilaterals (rectangles, squares, trapezoids) (Using the Pythagorean theorem will not be required as a strategy.); and** • **The area and circumference of circles.** **DOK - 2** *MA-07-2.1.1a* *Students will estimate measurements of regular and irregular polygons and circles in standard units.* *MA-07-2.1.1b* *Students will explain how measurements and measurement formulas are related or different (e.g., perimeter and area of rectangles).*	**MA-08-2.1.1** **Students will determine:** • **Measures of both regular and irregular shapes, including lengths to the nearest sixteenth of an inch or the nearest millimeter;** • **The area and perimeter of triangles and quadrilaterals; and** • **The area and circumference of circles.** **DOK - 2** *MA-08-2.1.1a* *Students will estimate measurements in standard units in real world and/or mathematical situations.* *MA-08-2.1.1b* *Students will explain how measurements and measurement formulas are related or different (perimeter and area; rate, time, and distance; circumference and area of a circle).*
	MA-07-2.1.2a *Students will find the measures of angles by estimation and measurement with a protractor or angle ruler.*	**MA-08-2.1.2** **Students will evaluate the measures of angles by estimation and measurement with a protractor or angle ruler.** **DOK - 2**
		MA-08-2.1.3 **Students will apply formulas to determine the volume of right rectangular prisms in real-world problems.** **DOK – 2**

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Italics – Supporting Content Statement

		MA-08-2.1.3a *Students will use formulas to find surface area of right rectangular prisms in real world and/or mathematical situations.*
		MA-08-2.1.4 **Students will apply the Pythagorean theorem to determine the length of a hypotenuse.** **DOK - 2**
Systems of Measurement		
MA-06-2.2.1a *Students will describe and provide examples of U.S. Customary and metric units of measurement and use these units to solve real-world and/or mathematical problems.*	*MA-07-2.2.1a* *Students will describe and provide examples of U.S. Customary and metric units of measurement and use these units to solve real-world and/or mathematical problems.*	**MA-08-2.2.1** **Students will provide examples of and apply money, time, and U.S. Customary and metric units of measurement to solve real-world problems.** **DOK - 2**

Geometry		
Middle grade students expand analysis of two-dimensional shapes and three-dimensional shapes. They translate shapes in a coordinate plane. They extend work with congruent and similar figures, including proportionality. They use the Pythagorean theorem.		
6th Grade	**7th Grade**	**8th Grade**
Shapes and Relationships		
MA-6-3.1.1 Students will describe and provide examples of the basic geometric elements (points, rays, lines, segments, angles [acute, right, obtuse], planes, radius, diameter, circumference). DOK - 2	*MA-07-3.1.1a Students will describe, provide examples of, and identify (using correct notation, label, and name) the basic geometric elements (e.g., points, segments, rays, lines, angles, and planes), including both real world and/or mathematical situations.*	*MA-08-3.1.1a Students will describe and provide examples of, basic geometric elements that include points, segments, rays, lines, angles, and planes, and will use these elements in real-world and/or mathematical situations.*
MA-06-3.1.2 Students will describe, and provide examples and properties of two-dimensional figures (circles, triangles, quadrilaterals, regular polygons), and will apply these properties and figures to solve real-world problems. DOK - 2	**MA-07-3.1.2 Students will describe, and provide examples and properties (e.g., sides, vertices, angles, congruent parts) of two-dimensional figures (circles, triangles [acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals [square, rectangle, rhombus, parallelogram, trapezoid], regular polygons), and will apply these properties and figures to solve real-world problems. DOK - 2**	**MA-08-3.1.2 Students will identify and compare properties of two-dimensional figures (circles, triangles acute, right, obtuse, scalene, isosceles, equilateral], quadrilaterals [square, rectangle, rhombus, parallelogram, trapezoid], regular/irregular polygons), and will apply these properties and figures to solve real-world problems. DOK - 2**
MA-06-3.1.3a Students will describe, provide examples of, and identify properties (e.g., vertices, angles, faces, edges, congruent parts) of common three-dimensional figures (spheres, cones, cylinders, prisms, and pyramids).	*MA-07-3.1.3 a Students will describe, provide examples of, and identify properties (e.g., vertices, angles, faces, edges, congruent parts) of common three-dimensional figures (spheres, cones, cylinders, prisms, and pyramids)*	**MA-08-3.1.3 Students will compare properties of three-dimensional figures (spheres, cones, cylinders, prisms, pyramids), and will apply these properties and figures to solve real-world problems. DOK - 2**

MA-06-3.1.4 **Students will describe and provide examples of congruent and similar figures, and will apply congruent and similar figures to solve real-world problems.** **DOK - 2**	**MA-07-3.1.4** **Students will describe and provide examples of congruent and similar figures, and will apply congruent and similar figures to solve real-world problems.** **DOK - 2**	**MA-08-3.1.4** **Students will provide examples of congruent and similar figures, will apply congruent and similar figures to solve real-world problems, and will apply proportional reasoning to solve problems involving scale drawings and proportional figures.** **DOK - 3**
Transformations of Shapes		
MA-06-3.2.1a *Students will describe, provide examples of, and apply line symmetry to real world and/or mathematical situations.*		*MA-08-3.2.1a* *Students will describe, provide examples of, and apply to real world and/or mathematical situations rotational symmetry (90°, 180°, 360°).*
MA-06-3.2.2 **Students will transform (translate and reflect across a horizontal or vertical line) figures in the first quadrant of the coordinate plane and determine new coordinates of the shape after transformation.** **DOK - 2** *MA-06-3.2.2a* *Students will move shapes in Quadrant I of the coordinate plane: rotate (turn)*	*MA-07-3.2.2a* *Students will translate (slide) and reflect (flip) figures in a coordinate plane*	**MA-08-3.2.2** **Students will transform (translations, reflections, and dilations with the center of dilation at the origin) figures in a coordinate plane and determine the new coordinates of the shape after the transformation.** **DOK - 2** *MA-08-3.2.2a* *Students will rotate (clockwise or counterclockwise) about the origin, shapes in a coordinate plane.*
Coordinate Geometry		
MA-06-3.3.1 **Students will identify and graph ordered pairs on a positive coordinate system, correctly identifying the origin, axes, and ordered pairs; and will apply graphing in the coordinate system to solve real-world problems.** **DOK - 2**	**MA-07-3.3.1** **Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes, and ordered pairs; and will apply graphing in the coordinate system to solve real-world problems.** **DOK - 2**	**MA-08-3.3.1** **Students will identify and graph ordered pairs on a coordinate system, correctly identifying the origin, axes, and ordered pairs; and will apply graphing in the coordinate system to solve real-world problems.** **DOK - 2**

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Italics – Supporting Content Statement

Data Analysis and Probability
Middle grades students extend the early development of data representations and examine the appropriateness of graphs and representations of data. They examine central tendencies and dispersion. They develop organized approaches to counting and use experimental and theoretical probabilities.

6th Grade	7th Grade	8th Grade
Representations of Data Sets		
MA-06-4.1.1 **Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots).** **DOK - 3** *MA-06-4.1.1a* *Students will explain how different representations of data (e.g., tables, graphs, diagrams, plots) are related.*	**MA-07-4.1.1** **Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots).** **DOK - 3** *MA-07-4.1.1a* *Students will explain how different representations of data (e.g., tables, graphs, diagrams, plots) are related.* *MA-07-4.1.1b* *Students will read/interpret, analyze, and make inferences from box and whisker of data and make predictions and draw conclusions from the data.*	**MA-08-4.1.1** **Students will analyze and make inferences from data displays (drawings, tables/charts, pictographs, bar graphs, circle graphs, line plots, Venn diagrams, line graphs, stem-and-leaf plots, scatter plots, histograms, box-and-whiskers plots).** **DOK - 3** *MA-08-4.1.1a* *Students will explain how different representations of data (e.g., tables, graphs, diagrams, plots) are related.*
MA-06-4.1.2 **Students will construct data displays (bar graphs, line plots, Venn diagrams, tables, line graphs), and will explain why the type of display is appropriate for the data.** **DOK - 2**	**MA-07-4.1.2** **Students will construct data displays (bar graphs, line plots, Venn diagrams, tables, line graphs, stem-and-leaf plots), and will explain why the type of display is appropriate for the data.** **DOK - 2** *MA-07-4.1.2a* *Students will make decisions about how misleading representations affect interpretations and conclusions about data (e.g. changing the scale on a graph).*	**MA-08-4.1.2** **Students will:** **Construct data displays (Venn diagrams, tables, line graphs, stem-and-leaf plots, circle graphs, scatter plots);** **Will explain why the type of display is appropriate for the data; and** **Will explain how misleading representations affect interpretations and conclusions about data (e.g., changing the scale on a graph).** **DOK – 2** *MA-08-4.1.2a* *Students will construct box-and-whiskers plots.*

Characteristics of Data Sets		
MA-06-4.2.1 **Students will determine and apply the mean, median, mode, and range of a set of data.** **DOK - 2**	**MA-07-4.2.1** **Students will determine the mean, median, mode, and range of a set of data, and will recognize clusters, gaps, and outliers within the data.** **DOK - 2**	**MA-08-4.2.1** **Students will:** • **Determine the mean, median, mode, and range of a set of data;** • **Will identify clusters, gaps, and outliers; and** • **Will apply these concepts to compare sets of data.** **DOK - 2**
Experiments and Samples		
		MA-08-4.3.1a *Students will explain how data gathering, bias issues, and faulty data analysis, can affect the results of data collection*
Probability		
MA-06-4.4.1 **Students will describe or determine (e.g., tables, tree diagrams) the sample space of an event.** **DOK - 2**	**MA-07-4.4.1** **Students will apply counting techniques to determine the size of a sample space.** **DOK - 2**	**MA-08-4.4.1** **Students will apply counting techniques to determine the size of a sample space.** **DOK - 2**
MA-06-4.4.2 **Students will determine simple probabilities based on the results of an experiment and will make inferences based on the data.** **DOK - 3**	**MA-07-4.4.2** **Students will:** • **Determine theoretical probabilities of simple events;** • **Determine probabilities based on the results of an experiment; and** • **Make inferences from probability data.** **DOK - 3** *MA-07-4.4.2a* *Students will tabulate experimental results from simulations and explain how theoretical and experimental probabilities are related.*	**MA-08-4.4.2** **Students will:** • **Determine theoretical probabilities of simple events;** • **Determine probabilities based on the results of an experiment; and** • **Make inferences from probability data.** **DOK - 3** *MA-08-4.4.2a* *Students will tabulate experimental results from simulations and explain how theoretical and experimental probabilities are related.* *MA-08-4.4.2b* *Students will determine theoretical probabilities and represent them using area models.*

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Italics – Supporting Content Statement

Algebraic Thinking		
Middle grade students extend pattern work to include arithmetic sequences. They use linear functions and linear equations. They plot rational number pairs in the Cartesian plane. They simplify algebraic and numeric expressions. They explore the effects of change on related variables. They use and solve two-step single variable equations and inequalities.		
6th Grade	**7th Grade**	**8th Grade**
Patterns, Relations, and Functions		
MA-06-5.1.1 **Students will extend and describe rules for patterns from real-world and/or mathematical problems** **DOK - 3**	**MA-07-5.1.1** **Students will extend and describe rules for patterns from real-world and/or mathematical problems.** **DOK - 3**	*MA-08-5.1.1a* *Students will use variables to describe numerical patterns based on arithmetic sequences in real world and/or mathematical situations (i.e.* $f(N)=2N+3)$*.*
MA-06-5.1.2 **Students will create tables for functions and will apply the tables to solve real-world problems.** **DOK - 2** *MA-06-5.1.2a* *Students will describe, define, provide examples of, and apply to real world and/or mathematical situations functions using tables, graphs and verbal rules.* *MA-06-5.1.2b* *Students will explain how tables and graphs and patterns relate to each other*.	**MA-07-5.1.2** **Students will represent, analyze, and generalize functions using tables, graphs, and words, and will apply the functions to solve real-world problems.** **DOK - 2** *MA-07-5.1.2a* *Students will explain how tables, graphs, patterns, verbal rules, and equations relate to each other*	**MA-08-5.1.2** **Students will represent, analyze, and generalize functions using tables, graphs, words, and algebraic expressions, and will apply the functions to solve real-world problems.** **DOK - 2**
MA-06-5.1.3a *Students will explain how the change in one quantity affects change in another quantity (e.g., in tables or graphs, input/output tables).*	**MA-07-5.1.3** **Students will explain how the change in one quantity affects the change in another quantity (e.g., in tables or graphs).** **DOK - 2**	**MA-08-5.1.3** **Students will explain how the change in one variable affects the change in another variable (e.g., if rate remains constant, an increase in time results in an increase in distance).** **DOK - 2**

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Italics – Supporting Content Statement

Variables, Expressions, and Operations		
MA-06-5.2.1 **Students will substitute values for variables (up to two different variables) and evaluate algebraic expressions.** **DOK - 2** *MA-06-5.2.1a* *Students will describe, define, and provide examples of variables and expressions with a missing value based on real-world and/or mathematical situations.*	**MA-07-5.2.1** **Students will substitute values for variables (up to three different variables) and evaluate algebraic expressions.** **DOK - 2** *MA-07-5.2.1a* *Students will describe, define, and provide examples of variables and expressions with a missing value based on real-world and/or mathematical situations.*	**MA-08-5.2.1** **Students will evaluate and simplify algebraic expressions applying the order of operations.** **DOK - 2** *MA-08-5.2.1a* *Students will describe, define, and provide examples of variables and expressions with a missing value based on real-world and/or mathematical situations.*
Equations and Inequalities		
MA-06-5.3.1 **Students will model and solve real-world problems with simple equations and inequalities (e.g., 8x=4, x+2>5).** **DOK - 2**	**MA-07-5.3.1** **Students will model and solve real-world problems with one- or two-step equations or inequalities (e.g., 2x+1=9, 3x+3<9). (Statements and solutions use only non-negative numbers.)** **DOK - 2**	**MA-08-5.3.1** **Students will model and solve real-world problems with one- or two-step equations or inequalities (e.g., 4x+2=22, x-4<-60).** **DOK - 2**

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